

## REMARKS

Reconsideration of the above-identified patent application in view of the remarks following is respectfully requested.

Claims 1-47 and 49-56 are pending in the application. Of the above, claims 29-38 have been allowed. Claims 1- 7, 9, 11, 14-21, 27-28, 39-42, 44-47, 49-52 and 54-56 have been rejected and claims 8, 10, 12, 13, 22-26, 43 and 53 and 48 have been objected to by the Examiner. Applicant gratefully acknowledges the allowance of claims 29-38. The Examiner's rejections and objections are respectfully traversed.

### § 102(b) Rejections

The Examiner has rejected claims 1-7, 16-21, 39-42 and 49-52 under 35 U.S.C. § 102(b) as being anticipated by US Patent No. 6,245,591 B1 to Beratan et al (hereinafter Beratan). The Examiner's rejection is respectfully traversed. Applicant submits that Beratan's patent has absolutely no resemblance to, and absolutely no bearing on the present invention, for reasons explained below.

Beratan's patent discloses an optical coating for an uncooled focal plane array detector where the optical coating comprises a porous film (element 64 in FIGS. 3-6).. The porous film preferably comprises a xerogel. The detector technology described therein is well known and old, involving pyroelectric detectors. The invention is directed toward enhancing the IR absorption (or Modulation Transfer Function, see col. 1 line 54-56) of such detectors This is achieved by the inclusion of the porous film on top of the pyroelectric material (col. 1 line 36 and col. 1 line 60).

Beratan does not disclose any new method for reading the temperature of the pyroelectric detector. Furthermore, his invention does not include optical components in any way, and the only reference he makes to "index of refraction" is with regard to its relation to the thickness of the porous layer. This comment is made in col. 5 line 45, wherein it is stated that the thickness of the porous layer has to be taken with respect to the index of refraction. This consideration is known as "impedance matching", to ensure maximal IR absorption.

In contrast, the present invention discloses (e.g. in claim 1) a thermal detection systems comprising of a temperature sensing element (TSE) that includes an **electro-optic (EO)** material and characterized by an index of refraction, **an electrical mechanism for inducing a change in said index of refraction, and an optical readout mechanism for reading said refraction index change**, thereby providing a reading of said TSE temperature.

Beratan's detector (and pyroelectric detectors in general) relies solely on the **electrical** properties of the TSE, whereas the present invention deals with detector **electro-optical** properties. The manifestation of these properties is achieved in an entirely different way. In pyroelectric detectors, one measures a displacement current associated with **changes of temperature**. With the EO detectors of the present invention, one measures a birefringence associated with a **steady state temperature** of the TSE. Not only is the measured property (electrical vs. optical) different, but so is the mode of operation (AC vs. DC).

Although Beratan's invention and the present one are so basically different that they have practically nothing in common, the Examiner's rejections are addressed in more detail below.

Regarding claim 1, Beratan does not disclose a thermal detection systems comprising of a TSE that includes an *EO material* and characterized by an index of refraction, *an electrical mechanism for inducing a change in said index of refraction, and an optical readout mechanism for reading said refraction index change*, thereby providing a reading of said TSE temperature. The passages cited by the Examiner in col. 2 refers to prior art, not Beratan's own invention, the detailed description of which starts in his col. 3. Beratan's system and method do not use, in any way, *EO* materials, and do not use an *optical* readout mechanism but an *electrical* readout mechanism (integrated sensing structure 48, Table 1 and col. 5, lines 5-10). Beratan does not use an *optical* pyroelectric material. Throughout his disclosure and claims, there is not even a single reference to the index of refraction of the pyroelectric material (the equivalent of the TSE in the current invention) and, *mutatis mutandis*, there is no reference to an electrical mechanism for changing an index of refraction of an *EO* material, and an optical mechanism for reading such change...

In summary, regarding claim 1, Applicant submits that Beratan fails to disclose even a single one of its elements. Consequently, Beratan cannot anticipate and cannot even render obvious claim 1.

Regarding claim 2, which depends from claim 1, Beratan does not disclose a thermal detection system as in claim 1 with an EO layer that has a length axis, since there is no EO layer in his invention; he does not disclose a laser beam configured to propagate through the EO layer as part of the optical reading mechanism, since there is no optical reading mechanism in his system/method; and he does not disclose a power meter for reading a change in the intensity of the laser beam after the beam exits said EO layer for obvious reasons. Therefore, Beratan neither anticipates nor renders obvious claim 2.

Regarding claim 3, Beratan does not disclose a thermal detection system as in claim 1 further comprising an absorbing layer attached to said EO layer, whereby radiation emitted by a remote body and absorbed in said absorbing layer determines said TSE temperature, for reasons argued above re. claim 1. Therefore, Beratan neither anticipates nor renders obvious claim 3.

Regarding claim 4, Beratan does not disclose a thermal detection system as in claim 1, wherein the radiation is infrared radiation, for reasons argued above re. claim 1. In addition, the cited passage (col. 1, lines 14-19) refers to well known prior art, not Beratan's invention. Therefore, Beratan neither anticipates nor renders obvious claim 4.

Regarding claim 5, Beratan does not disclose a system as in claim 1, further comprising a thermal link connecting said EO layer to a thermally conducting substrate that serves as a heat sink, and a temperature controller connected to said substrate and used for setting said substrate temperature, for reasons argued above re. claim 1. Therefore, Beratan neither anticipates nor renders obvious claim 5.

Regarding claims 6 and 7, the cited passage (col. 2, lines 14-16) refers to well known prior art, not Beratan's invention. Beratan does not disclose a system as in claim 1, wherein the EO material is a ferroelectric material in a paraelectric phase. Therefore, Beratan neither anticipates nor renders obvious claims 6 and 7.

Regarding claim 16, which parallels claim 1 in elements (a), (b) and (c), Beratan does not disclose any of these elements, as argued above re. claim 1. Therefore, Beratan neither anticipates nor renders obvious claim 16.

Regarding claims 17, 18, 19, 20 and 21, which depend from claim 16, they parallel claims 3-7 and are neither anticipated nor rendered obvious by Beratan for the same reasons.

Regarding claim 39, this claim has method steps that parallel elements of system claim 1, i.e. providing a TSE that includes an *EO* material layer and characterized by an index of refraction, exposing the TSE to radiation, thereby affecting the temperature of the *EO* material, *electrically inducing a change in the index of refraction, the change correlated with the TSE temperature, and optically reading the refraction index change*, thereby providing a reading of the TSE temperature. Beratan does not provide an *EO* material layer, does not *electrically induce a change in its index of refraction* and does not *read a refraction index change optically*. Therefore, Beratan neither anticipates nor renders obvious claim 39.

Regarding claim 40, the cited paragraph relates to well known prior art, not Beratan's invention. The limitation is imposed on claim 39, which is neither anticipated nor rendered obvious by Beratan. Therefore, Beratan neither anticipates nor renders obvious claim 40.

Regarding claims 41 and 42, Beratan neither anticipates nor renders them obvious for reasons argued above with regard to claims 2, 6 and 7.

Regarding claim 50, Beratan does not disclose a method for thermal imaging comprising the steps of providing a plurality of TSEs, each the TSE having an EO material layer and characterized by an index of refraction, providing at least one dummy, wherein the TSEs and the at least one dummy are located in respective adjacent columns, electrically inducing a change in the index of refraction of each the TSE, the refraction index change correlated with a temperature of the TSE, and optically reading each the TSE refraction index change, thereby providing a reading of each the TSE temperature. As argued above re. claim 39, Beratan's method has practically no overlapping or even similar steps to the method recited in claim 39. The

same argument applies to claim 50. Therefore, Beratan neither anticipates nor renders obvious claim 50.

Regarding claim 51, 52 which parallel claims 41, 42 in terms of the recited limitations, Applicant submits that Beratan neither anticipates nor renders them obvious.

### **§ 103(a) Rejections**

The Examiner has rejected claims 9, 11 and 14-15, 27, 28, 44-47, and 55-56 as being unpatentable over Beratan et al (US Patent No. 6,245,591 B1) in view of Jaeger et al (US 4,758,060). The combination of Beratran and Jaeger is used by the Examiner to rejecte claims 9, 11 and 14-15 as applied to claim 2, claims 27, 28 as applied to claim 16, claims 44-47 as applied to claim 41 and 54-56 as applied to claim 51. Applicant submits that since Beratan's invention, as argued in detail above, has practically nothing in common with the present invention, any combination of any other reference with Beratan cannot render the present invention obvious, since it would lead to a system, method and results totally different from those of the present invention. The combined teachings of Jaeger and Beratran cannot in any possible way render obvious a system and method in which a TSE that includes an *EO* material characterized by an index of refraction *has the index changed by an electrical mechanism* and *has the index change read by an optical readout mechanism*, thereby providing a reading of said TSE temperature. In conclusion, Applicant submits that claims 9, 11 and 14-15, 27, 28, 44-47 and 55-56 are not rendered obvious by Beratran in view of Jaeger.

### **Objections**

Claims 8, 10, 12, 13, 22-26, 43 and 53 and 48 have been objected to by the Examiner as being dependent upon a rejected base claim, but allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicant respectfully submits that all base claims are allowable, and therefore the rewriting of the objected to claims indicated above is unnecessary.

In view of the remarks above, it is respectfully submitted that claims 1- 47 and 49-56 are now in condition for allowance. Prompt notice of allowance is respectfully and earnestly solicited.

Respectfully submitted,

  
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Date: February 10, 2006